interaction increases with altitude. This study, therefore, is the first to test (and to provide support for) the SGH in the sub-Antarctic, and highlights the broad applicability of the SGH for predicting spatial variation in plant interactions at high latitudes and altitudes.

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Improved flowering of a South African *Watsonia* with smoke treatments

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Although smoke treatments have successfully been used for promoting germination of many species, the effect of smoke in promoting flowering has not been widely investigated. Greenhouse experiments were conducted to evaluate the effect of different smoke treatments on the flowering of a spring-flowering hybrid of *Watsonia borbonica*. Corms of Watsonia 'Shrimp Pink' were treated with aerosol smoke or smoke water prior to planting in autumn (ten plants per treatment). For the aerosol smoke treatment, corms were placed in a sieve and exposed to cooled smoke for 30 min. For the drench treatments, 100 mL of smoke solution (1:500 or 1:2000 dilution) were applied to the plants weekly. A once-off drench treatment of a 1:500 smoke solution was also carried out. Only two of the control plants produced flowering spikes, whereas up to nine out of ten plants treated with a drench of 1:500 dilution of smoke water flowered. The development of a flowering spike did not appear to correlate with original corm size. Additionally, although not statistically significant, the average increase in corm weight was greater in smoke-treated plants than the control. Thus, smoke treatments may potentially be used to promote flowering in some geophytes.

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The pathway of starch degradation in potato leaves

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Starch degradation in leaves is a process that is still not well understood. Using a reverse genetics approach we have identified enzymes that are involved in this process. One of these is a protein which has a completely novel activity in that it phosphorylates starch using ATP, but utilizes a dikinase mechanism, transferring the β-phosphate to starch while releasing the γ-phosphate into solution. Plants lacking this protein contain starch with reduced levels of covalently bound phosphate and are unable to degrade transitory starch during the dark period. In addition we have identified a plastically localize β-amylase isoform which, when repressed using an antisense construct, also leads to the production of plants that are unable to degrade leaf starch to the same extent as controls. β-amylase manufactures maltose as a product of starch degradation and we have also identified a transglucosidase enzyme which is responsible for maltose catabolism. Plants lacking this enzyme accumulate maltose, and also are repressed in starch degradation.

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The effect of some of the indigenous medicinal plants in treatment of tick infected cattle-wounds in the Vhembe district of Limpopo Province, RSA

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Poor animal health is an important factor limiting animal productivity in most developing countries. Traditional medicine is important in developing countries that lack access to conventional medicines for animal health care. It has also been found to be accessible and affordable to poor rural farmers. Anti-repellent activities on indigenous medicinal plants that are used in treatment of wounds caused by ticks are being investigated. Instead of waiting for the wounds to be caused by ticks it can be productive to stop the ticks from attacking the animals.

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New generic circumscriptions of Cape peucedanoid species (Apiaceae)

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The genus *Peucedanum* L. as traditionally circumscribed is a group of ca. 120 species found in Africa, Europe and Asia. It is generally accepted that *Peucedanum sensu lato* is

not monophyletic and that the name should be applied to a small group of 8–10 Eurasian species. Recent molecular phylogenetic studies show that the African species of *Peucedanum* form a distinct clade completely separate from the superficially similar Eurasian species. As a first step towards a re-evaluation of generic concepts, the 17 species occurring within the Cape Floristic Region were studied. Three morphologically well defined groups can be identified. These groups are supported to some extent by molecular sequence data which includes a comprehensive sampling of the Cape species as well as representatives of other African and Eurasian species. A new generic classification system is presented in which the two woody groups are described as two new genera and the herbaceous genus *Cynorhiza* reinstated and expanded to include two additional species. The morphology, fruit anatomy, geographical distribution and phylogenetic relationships based on morphological and molecular sequence data for all the Cape species are presented.

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Changing the chemical mosaic of South African medicinal plants through biotechnological strategies

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Biotechnology has many benefits to medicinal taxa but exploitation of this technology remains largely in its infancy in South Africa and Africa at large. This paper reviews successes with the application of both tissue culture and transgenic technologies in indigenous South African aromatic medicinal plants. Species such as *Salvia* and *Pelargonium* have been utilized as targets in our laboratories and will serve to highlight the benefits of a biotechnological approach to adding value to medicinal flora. The developed *in vitro* propagation methods for both *Salvia* and *Pelargonium* species were simple and culminated in expeditious plantlet production, with plantlets establishing readily *ex vitro*. Through *Agrobacterium rhizogenes* mediated transformation, several root clones with phenotypic traits characteristic of the hairy root syndrome were established and subsequent metabolic profiling using LCMS indicated that transgene integration induces significant chemical interclonal variation. Alterations to this profile may further be elicited through application of methyljasmonate, a signalling compound in plants. Although root extracts from transgenic cultures exhibit different chemical profiles compared to wildtype root cultures, their biological activity in pharmacological bioassays is surpassed by extracts from *in vitro* propagules of *Salvia*. In this case, the tissue culture system may not only serve/facilitate conservation of these plants as they are popular as herbal products in the traditional medicines sector but the culture microenvironment also appears to induce *de novo* biosynthesis of compound(s). Such changes in the metabolome are thought to be responsible for the interesting pharmacological actions apparent in tissue culture-derived extracts but that are not indicated in the natural plant; thus making the tissue culture system superior for commercial exploitation. As transgenesis modifies the chemical composition of root clones, hairy root cultures may provide a valuable tool for improving our fundamental understanding of secondary metabolism.

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Keys to the non-geniculate coralline algae (Corallinales, Rhodophyta) of South Africa

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Non-geniculate coralline red algae are common in all of the world's oceans where they often occupy close to 100% of the primary rocky substratum. The South African rocky subtidal and intertidal habitats in particular, are rich in quantity and diversity of non-geniculate coralline red algae. Despite their ubiquity, they are a poorly known and poorly understood group of marine organisms. Few scattered records of non-geniculate coralline red algae were published prior to 1993 but these should be considered dubious at best since many taxa have undergone taxonomic review since then. Also, genus names like *Lithophyllum* and *Lithothamnion* were loosely used by most authors for pretty much a host of different non-geniculate coralline algae. A series of taxonomic studies, based mainly on the Western Cape Province, published between 1993 and 2000 has significantly extended our knowledge of these algae from southern Africa. Other species are found only in KwaZulu-Natal and/or the Eastern Cape Province. References to these papers and older records are now gathered here and a preliminary list of the well delimited orders (1), families (3), subfamilies (4), genera (17) and species (46) are presented. Keys to the various taxonomic categories are also provided.

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